AMENDMENTS TO THE SPECIFICATION

Please replace paragraph [0038] with the following rewritten paragraph:

-- [0038] As shown in FIG. 3, a printed circuit board (PCB) 60 is mounted in the gearbox housing 12 against support surface 62 (as seen more clearly in FIG. 5). A brush card 64, which includes brushes 66 for commutation of the motor 14, is electrically connected to the PCB 60. The brush card 64 is physically mounted in slots 68 (FIG. 5) formed in the housing 12. A digital micro-controller 78 such as Mitsubishi part no. M30262F8GP is mounted on the PCB 60 and a flash memory for storing a servo-control program is connected to the micro-controller 78. The PCB 60 includes power switches such as FETs 70 (FIG. 3) which provide an H-bridge for controlling the motor 14. The PCB 60 also includes (on its underside, in FIG. 3) Hall effect sensors 72*a*, 72*b* for sensing magnet 34 and Hall effect sensors 80*a*, 80*b* for sensing magnet 48. Collectively, the PCB 60 and brush card 64 provide an on-board electronic servo-control system, which is discussed in greater detail below.--

Please replace paragraph [0040] with the following rewritten paragraph:

-- [0040] The PCB 60 and FETs 70 generate a significant amount of heat which must be dissipated. In the preferred embodiment, two layers of thermally conductive rubber 74, 76 are employed to protect the PCB 60 against shock and assist in dissipating heat. Rubber layer 74 is mounted between the bottom of the PCB 60 and a shelf 84 formed in the housing 12. The shelf 84 is integrated with a plurality of cooling fins 88 formed on the exterior of the housing 12. Rubber layer 76 is disposed on top of the FETs 70 and is in contact with the metallic top cover 82 thus providing a low resistance heat conduction path to the other side of the housing 12.--

Please replace paragraph [0047] with the following rewritten paragraph:

-- [0047] FIG. 9 shows one embodiment of the position detecting subsystem 112 in block diagram form. The subsystem 112 comprises ring magnets 34 and 48. Magnet 34 is a multipole

(e.g., 28 pole) ring magnet, as schematically depicted in FIG. 6B, which is read by Hall effect sensors 72*a*, 72*b*. These sensors 72*a*, 72*b* are spaced apart such that they generate two 90° out-of-phase signals 168, 169 that are interpreted by a quadrature decoding function as known in the art per se provided by the microcontroller 78. The microcontroller 78 adjusts an index counter (internal to the microcontroller 78) whenever signal 168 (the "pulse" signal) is pulsed as a result of detecting a magnetic pole transition. More particularly, the index counter is either incremented or decremented depending on whether the other signal 169 (the "direction" signal) leads or lags the pulse signal 168. In the preferred embodiment about 1200 pulses (with quadrature) represents a half-cycle of wiper arm travel.--

Please replace paragraph [0051] with the following rewritten paragraph:

-- [0051] Magnet 48 is employed to determine the position of the worm gear 42 and wiper arms 20, particularly upon power-up where the ~~wipers~~ wiper arms 20 may be situated in an unknown position. More particularly, magnet 48 provides plural magnetic sectors as shown in FIG. 10. With two Hall effect sensors 80*a*, 80*b* and four magnetic sectors 180*a* ... 180*d*, the position detecting subsystem 112 can detect four distinct zones. Whenever a zone crossing is detected, the subsystem 112 updates or resets the motor index counter to a pre-determined value based on the mechanical configuration between the motor 14 and worm gear 42. The index counter is incremented or ~~decrement~~ decremented based on the output of the other Hall effect sensors 72*a*, 72*b*, such that the angular position and velocity of the worm gear 42, and hence the wiper arms 20, is determined from the absolute zone information provided by the 4-sector magnet 48 on the worm gear 42 and the relative motor position provided by the multi-pole magnet 34 on the motor shaft 30.--

Please replace paragraph [0053] with the following rewritten paragraph:

-- [0053] FIG. 11 shows the positions of the sector magnet 48 over the corresponding cycle of motion of the windshield wiper arms 20. The positions are enumerated in the table set out below:--

Please replace paragraph [0054] with the following rewritten paragraph:

-- [0054] The cycle of motion of the windshield wiper arms 20 defines the following positions or zones: the ~~The~~ out-of-bound (OOB) zone represents an impermissible wiper position; the ~~The~~ park position or park zone corresponds to a range of angular positions for the worm gear 42 corresponding to the wiper arms 20 being parked; the ~~The~~ start wipe zone indicates the worm gear position(s) where the wiper arms 20 change direction at one end of travel; the ~~The~~ wipe zone is self-explanatory; and the ~~The~~ end of travel (EOT) zone represents the worm gear position(s) where the wiper arms 20 change direction at the other end of travel.--

Please replace paragraph [0055] with the following rewritten paragraph:

-- [0055] More specifically, when the four-sector magnet 48 is in position (a) as shown in FIG. 11, Hall effect sensor 80*a* detects a North pole and Hall effect sensor 80*b* detects a South pole, leading to a "10" state, representing ~~an~~ one of the out-of-bound ~~zone~~ zones. In position (b), the Hall effect sensors 80*a* and 80*b* both detect South poles, leading to "00" state in binary logic. This is the start wipe zone. As the worm gear 42 and magnet 48 are rotated counterclockwise the Hall effect sensors 80a and 80b enter a "01" state, representing the wipe zone. The EOT position within the wipe zone is detected by comparing the value of the index counter against a predetermined threshold value. At this point, the servo-control system reverses the ~~wipers~~ wiper arms 20 until the ~~"start wipe"~~ start wipe zone is detected and the motor index counter has reached a predetermined value, at which point the ~~wipers~~ wiper arms 20 will once again be reversed.--

Please replace paragraph [0056] with the following rewritten paragraph:

-- [0056] The OOB ~~zone functions~~ zones function as a failsafe reverse indicator. In the event the index counter malfunctions or is caused to malfunction by manual intervention, the four-sector magnet 48 physically identifies the impermissible zone, e.g., as in position (f) in FIG. 11, thus

allowing the servo-control system to reverse the direction of the motor 14 at this point. Alternatively, an error condition can be signaled as known in the art.--

Please replace paragraph [0057] with the following rewritten paragraph:

-- [0057] Note that the position sensing subsystem 112 can ascertain immediately upon power up the zone the wiper blades 24 are located in (OOB, park, start wipe, and wipe), without recourse to memory. Upon startup, the ~~servocontrol~~ servo-control system can begin to cycle the ~~wipers~~ wiper arms 20 by rotating them in either direction. As soon as the Hall effect sensors 80*a* and 80*b* register a state transition the angular position of the worm gear 42 and hence the position of the wiper arms 20 ~~position~~ is known absolutely. The micro-controller 78 uses this information to reset the motor index counter to a pre-determined value, as described previously.--

Please replace paragraph [0058] with the following rewritten paragraph:

-- [0058] In an alternative embodiment the four sector magnet 48 may be replaced by a single pole magnet 48' as shown in FIGS. 12A & 12B, wherein one face of the magnet 48' has a North orientation and the other face has a South orientation. In this case, since Hall effect sensors typically only sense the presence or absence of a South pole, a metallic (ferromagnetic) plate 182 may be used as shown in FIG. 13 to provide a pattern of magnetic pole sectors 184*a*...184*f* that are sensed by the Hall effect ~~sensor~~ sensors 80*a*, 80*b*, which in this embodiment are arranged 180° apart. The metallic plate 182 diverts or bends the magnetic flux lines so they are not detectable by the Hall effect sensors 80*a*, 80*b* (which in practice are positioned over an annular rim of the magnet 48' as schematically indicated in FIG. 12).--

Please replace paragraph [0059] with the following rewritten paragraph:

-- [0059] As seen in FIG. 13, the pole sectors 184*a*...184*f* are arranged to correspond with four zones used to control wiper arm 20 movement; (i) park zone, which indicates the range of angular positions for the worm gear 42 corresponding to the wiper arms 20 being parked; (ii)

start zone, which indicates the worm gear position(s) where the wiper arms 20 change direction at one end of travel; (iii) wipe zone; and (iv) end of travel (EOT) zone which indicates the worm gear position(s) where the wiper arms 20 change direction at the other end of travel. More specifically, in position (a) the Hall effect sensors 80*a* and 80*b* do not detect South poles, leading to a "11" state in binary logic. This is the start zone. In position (b) the magnet 48' is rotated clockwise by an angle θ_i such that both Hall effect sensors 80*a* and 80*b* detect South poles, leading to a "00" state. This is the wipe zone. In position (c) the magnet 48' is rotated even further clockwise θ_{ii} such that sensor 80*a*=1 and sensor 80*b*=0. This is the EOT zone. In position (d) the magnet ~~48~~ 48' is rotated counterclockwise θ_{iii} with respect to position (a) such that sensor 80*a*=0 and sensor ~~80*b*32~~ 80*b*=1. This is the park zone.--

Please replace paragraph [0060] with the following rewritten paragraph:

-- [0060] In the alternative embodiment the position sensing subsystem 112 can also immediately ascertain upon powering up in which zone the wiper blades 24 are located. As soon as the Hall effect sensors 80*a* and 80*b* register a state transition the angular position of the worm gear 42 is known absolutely. The micro-controller 78 uses this information to reset the motor index counter to a pre-determined value, as discussed previously.--

Please replace paragraph [0061] with the following rewritten paragraph:

-- [0061] The sector pattern of the alternative embodiment, however, does ~~has~~ have hysteresis problems. In particular, because magnetic sectors 184*c* and 184*e* are situated 180° apart and the Hall effect sensors 80*a*, 80*b* are also situated 180° apart, given the finite width of the edge of the metallic plate 182 it is possible for one of the Hall effect sensors 80*a*, 80*b* to register a change of state prior to the other sensor, leading to a misreporting of the actual zone. The control system can compensate for this problem by waiting for a short time period before acting upon a change of state, but this will delay the responsiveness of the system somewhat. In the preferred embodiment, however, as shown in FIG. 10, the arc length between the Hall effect sensors 80*a* and 80*b* is relatively small, e.g., less that 65°, and the arc length of each magnetic sector on

magnet 48 is greater than the arc length between the Hall effect sensors 80*a* and 80*b*. Thus, the Hall effect sensors 80*a*, 80*b* cannot change state simultaneously, eliminating the above-noted concern. The preferred embodiment thus employs a grey code strategy known in the art.--